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1. A regenerative fuel cell apparatus comprising an electrolyzer portion and a fuel cell portion;

wherein the electrolyzer portion has a cathode including a first electrolyzer cathode port and a second electrolyzer cathode port, an anode including a first electrolyzer anode port and a second electrolyzer anode port and a gas bypass conduit including a first gas bypass port and a second gas bypass port;

*A<sub>2</sub>*

wherein the fuel cell portion comprises a fuel cell anode including a first fuel cell anode port and a second fuel cell anode port, a fuel cell cathode including a first fuel cell cathode port and a second fuel cell cathode port, and at least one coolant channel including a first coolant port and a second coolant port; and

wherein the regenerative fuel cell system includes at least one of:

- (a) a connection between the second electrolyzer cathode port and the second fuel cell anode port, thereby to provide a continuous passage between the first electrolyzer cathode port and the first fuel cell anode port for hydrogen,
  - (b) a connection between the second electrolyzer anode port and the second coolant port, thereby to provide a continuous passage between the first electrolyzer anode port and the first coolant port; and
  - (c) a connection between the second gas bypass port and the second fuel cell cathode port, thereby to provide a continuous passage between the first gas bypass port and the first fuel cell cathode port.
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